Single Aisle
TECHNICAL TRAINING MANUAL
T1+T2 (IAE V2500) (Lvl 2&3)
PNEUMATIC

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PNEUMATIC

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PNEUMATIC SYSTEM COMPONENT LOCATION (2)

SYSTEM OVERVIEW

The Pneumatic system is used to supply High Pressure (HP) air for air conditioning, pressurization, Fuel Tank Inerting System (FTIS), engine start and anti-icing. HP air can be supplied from the two engines, the APU or an external ground source.

ENGINE BLEED

The engine bleed air receives pressure regulation and temperature regulation before it is supplied to the pneumatic system. Air is bled from two engine High Pressure Compressor (HPC) stages: the Intermediate Pressure (IP) stage and the HP stage.
The High Pressure Bleed Valve (HPV) supplies air to the system when the engines are at low power. When the IP bleed is sufficient, the HPV closes.
The Pressure Regulating Valve (PRV) is installed in the duct downstream of the IP and HP bleed valves, and pneumatically regulates the downstream pressure. Each Bleed Monitoring Computer (BMC) monitors the system pressure and will stop the engine bleed if the pressure is too high. An Overpressure Valve (OPV) is also installed downstream from the bleed valve as a protection of the system if the pressure is too high.
The temperature of the engine bleed air is regulated to a maximum value. The hot bleed air goes through an air-to-air heat exchanger called the precooler. Fan discharge air, modulated by the Fan Air Valve (FAV), is blown across the pre-cooler to keep the temperature within limits.

APU BLEED/EXTERNAL AIR

The left and right bleed systems are connected by a crossbleed duct. A crossbleed valve is used for their interconnection or isolation.
The APU can also be used for bleed air supply. This is usually done on the ground for air conditioning and for engine start.
But APU BLEED air can also be used in flight, in relation to the altitude. The altitude can be different for each aircraft. These altitude limits are given by the manufacturer. The APU bleed supply is connected to the left side of the crossbleed duct.
On the ground, a HP ground power unit can be connected to the left side pneumatic system. The right side can be supplied by opening the crossbleed valve.

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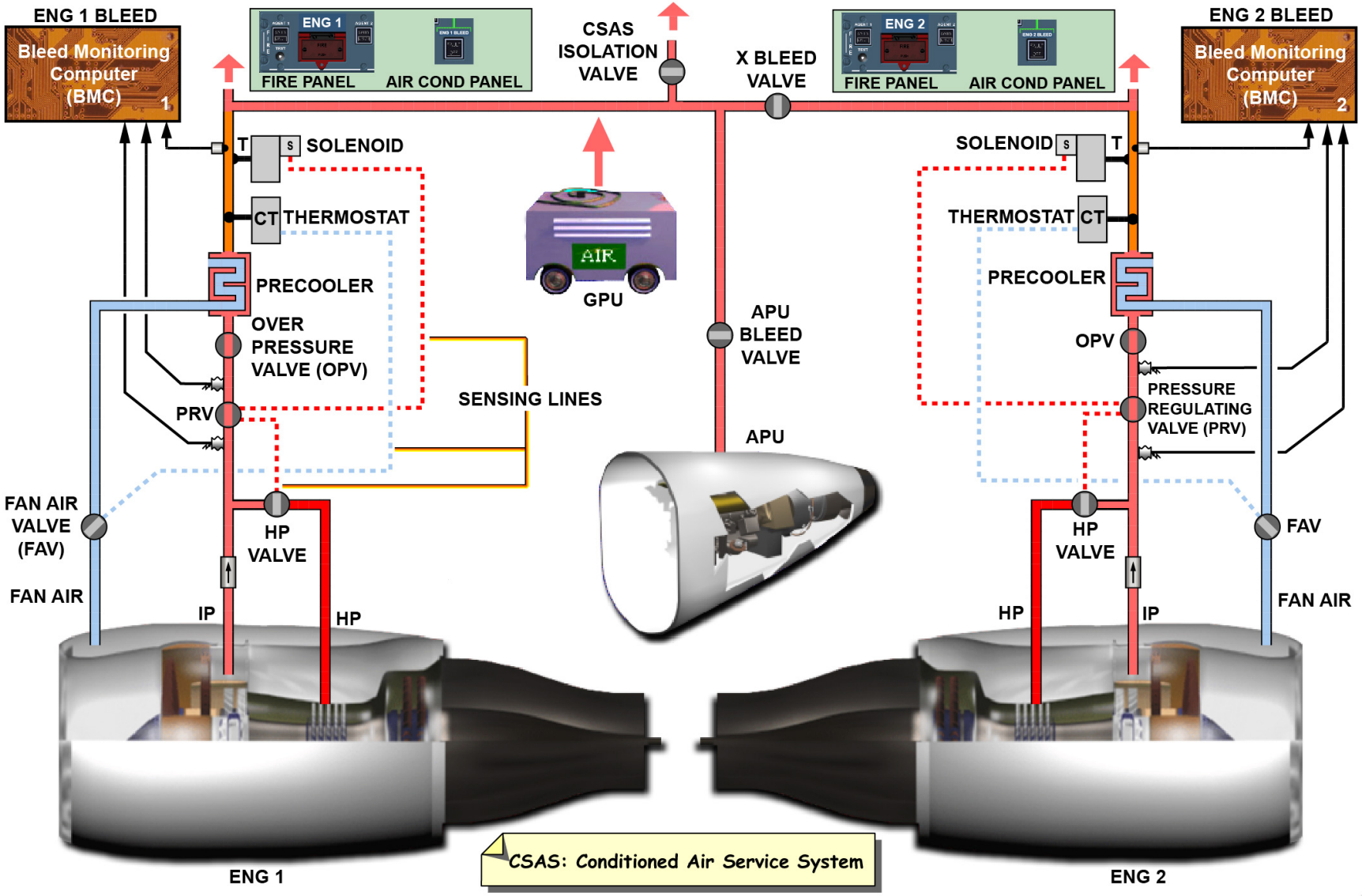


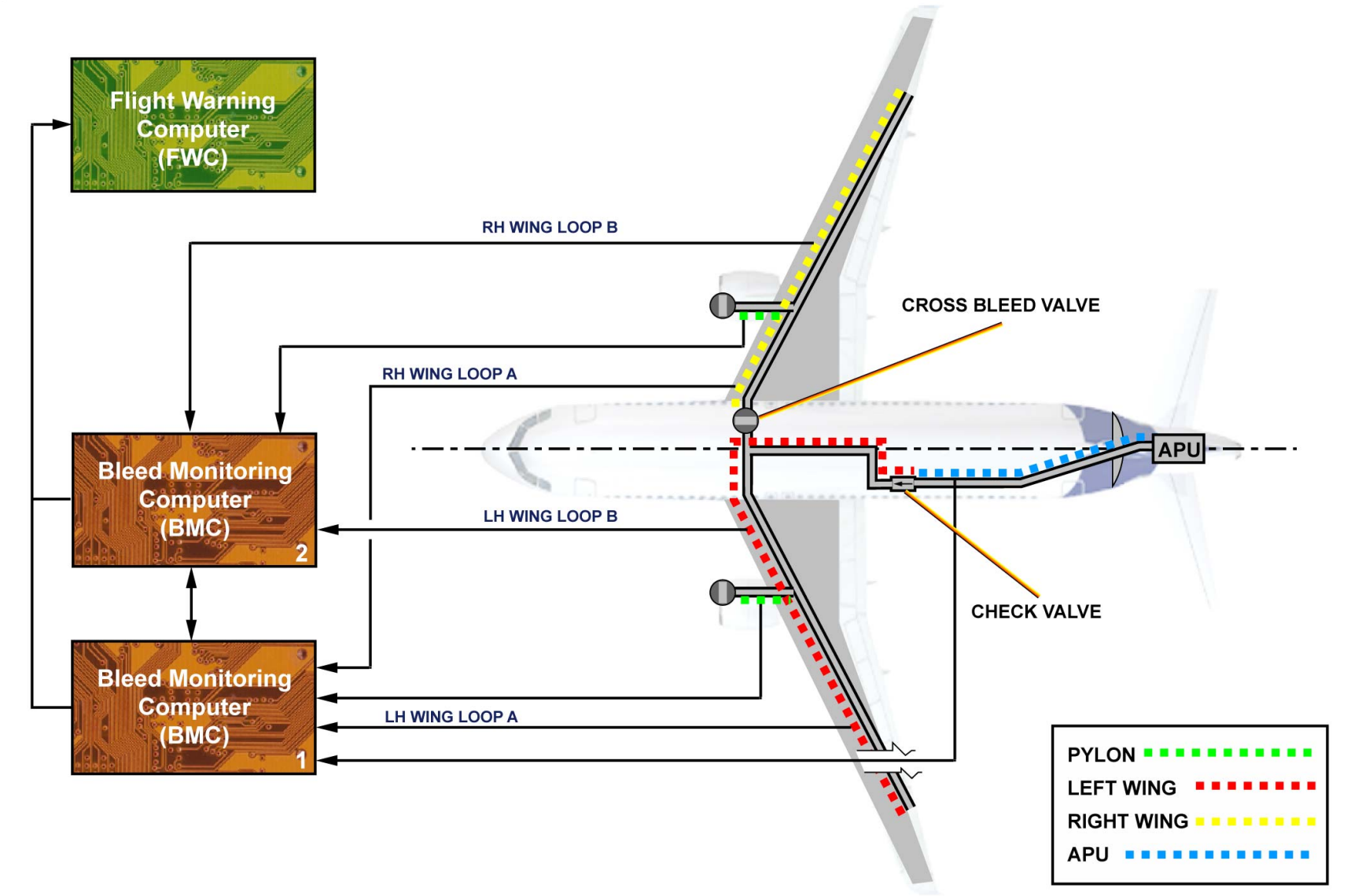
SYSTEM OVERVIEW - ENGINE BLEED & APU BLEED/EXTERNAL AIR

PNEUMATIC SYSTEM COMPONENT LOCATION (2)

SYSTEM OVERVIEW (continued)

LEAK DETECTION

Leak detection loops are installed along the hot air supply ducts of the pneumatic system and are connected to the BMCs. The leak detection system is organized into three loops. Here are the loops and the protected areas: - PYLON: the pre-cooler outlet area,
- WING: wing leading edge and belly fairing,
- APU: APU aft supply duct (left hand side of the fuselage) from APU firewall to wheel well area.



SYSTEM OVERVIEW - LEAK DETECTION

PNEUMATIC SYSTEM COMPONENT LOCATION (2)

COMPONENT LOCATION

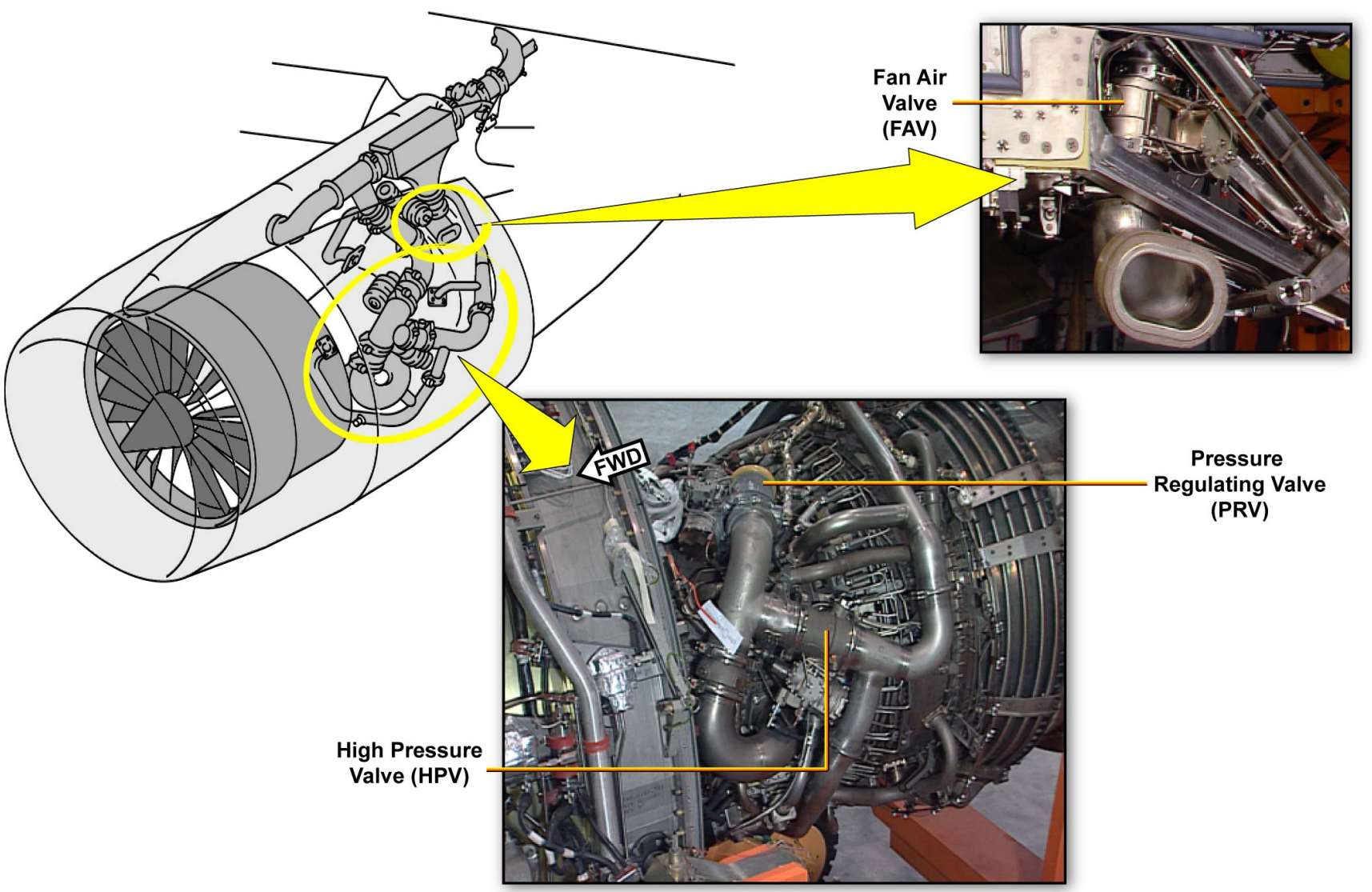
The primary components of the pneumatic system are installed on the engines and in the pylons.

PRESSURE REGULATION COMPONENTS

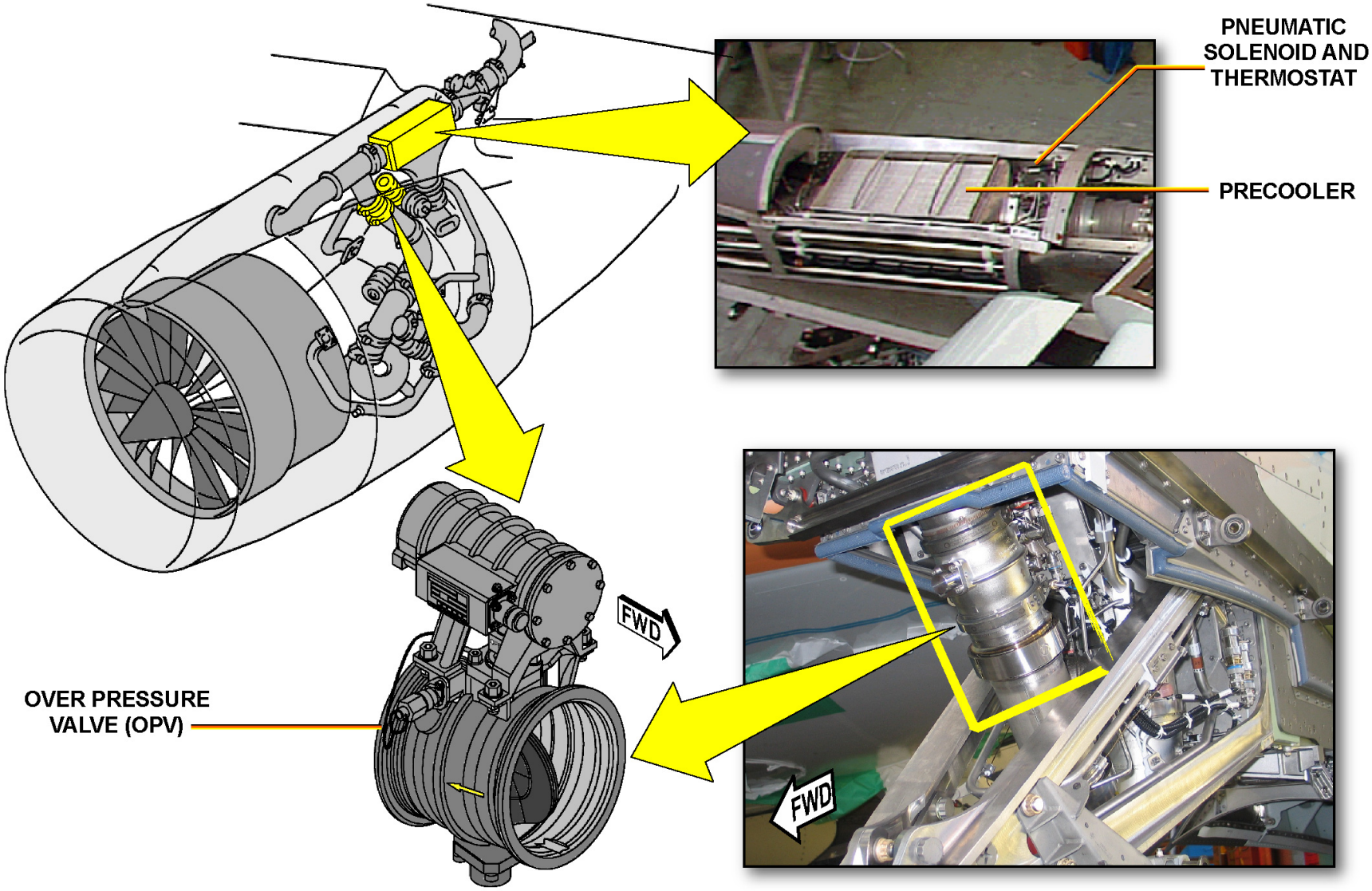
The pressure regulation components are on the engines:
- the Engine High Pressure Valve (HPV),
- the Engine BLEED PRV,
- the OPV.

TEMPERATURE REGULATION COMPONENTS

The temperature regulation components are on the engines and in the pylons:
- the FAV,
- the Precooler.



COMPONENT LOCATION - PRESSURE REGULATION COMPONENTS & TEMPERATURE REGULATION COMPONENTS



COMPONENT LOCATION - PRESSURE REGULATION COMPONENTS & TEMPERATURE REGULATION COMPONENTS

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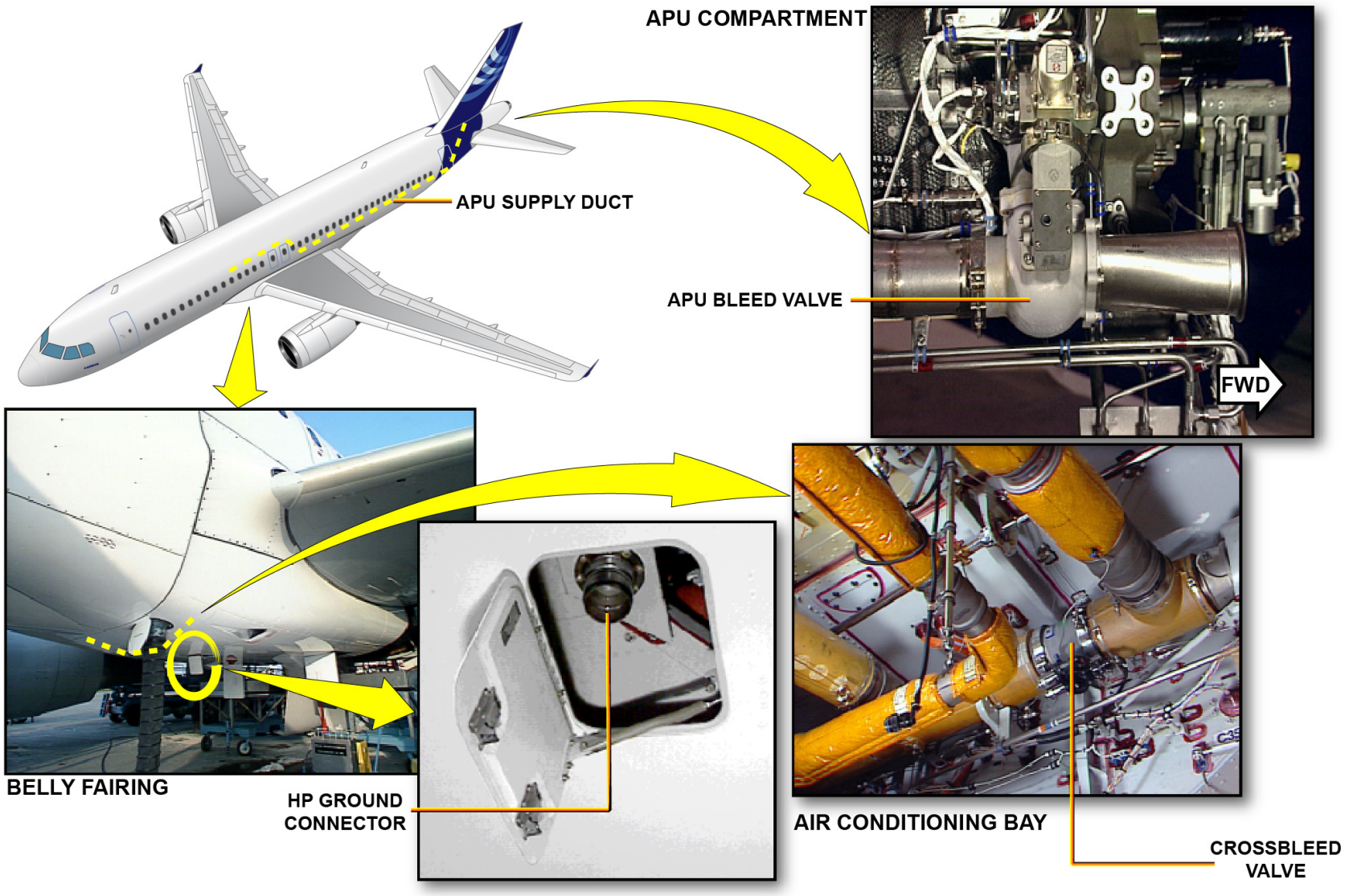
PNEUMATIC SYSTEM COMPONENT LOCATION (2)

COMPONENT LOCATION (continued)

OTHER COMPONENTS

The crossbleed valve is in the forward section of the lower fuselage belly fairing area.
Get access to the HP ground connector through a small access door which is on the lower fuselage belly fairing.
The APU bleed valve is on the APU.
The APU supply duct is installed along the left hand side of the fuselage to the wheel well area. It then goes across the aircraft centerline and continues forward to be connected to the crossbleed duct in the forward belly fairing area.



COMPONENT LOCATION - OTHER COMPONENTS

PNEUMATIC SYSTEM CONTROL & INDICATING (2)

LOCATE CONTROL/INDICATING IN COCKPIT

BLEED AIR SUPPLY ON GROUND

BLEED SUPPLY FROM ENGINES

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ENGINE BLEED SYSTEM DESCRIPTION (3)

B2 SCOPE

CAUTION: MODULE TAGGED B2 SCOPE.
BE AWARE THAT ONLY AVIONICS/ELECTRICAL TOPICS SHOULD BE LEARNED FOR A T2 COURSE.

GENERAL

The engine air bleed pressure is pneumatically regulated by the High Pressure (HP) Valve (VLV) when air is supplied by the HP stage, or by the Pressure Regulating Valve (PRV) when the air is supplied by the Intermediate Pressure (IP) stage. The pressure regulation system is monitored by two Bleed Monitoring Computers (BMCs).

HP VALVE

Switching between IP and HP is done pneumatically when the IP stage pressure is not sufficient (engine at low speed). The HP VLV pneumatically regulates the air supply between 8 and 36 psi. The HP VLV is forced to close when the PRV is closed via the PRV/HP VLV sense line. In flight, the Electronic Engine Control (EEC) for IAE V2500-A5 engines maintains the HP VLV closed.
When the solenoid is de-energized, the opening of the HP VLV is not inhibited. The solenoid will be energized by the EEC when:
- the engine is above idle, the pressure PS3 is greater than 110 psi for the single aisle family IAE V2500-A5 engine,
- the Wing Anti-Ice (WAI) is OFF,
- the altitude is over 15,000 ft,
- the pack configuration is normal.

IP CHECK VALVE

The IP check valve protects the IP stage from reverse flow when the HP VLV is open.

PRV/CONTROL SOLENOID

The PRV pneumatically regulates the bleed pressure around 44 psi. A thermal fuse causes the valve to close in case of engine fire at 450°C (842°F). The PRV is pneumatically controlled by an external servo-control, the bleed pressure regulated valve control solenoid (CTL SOL), located downstream from the precooler. The control solenoid operates in two modes, pneumatic and electric, causing complete closure of the PRV.
The pneumatic mode is used for:
- reverse flow protection - the PRV is closed when a delta pressure between the precooler outlet and the PRV inlet is detected.
The electrical mode with PRV shut-off function through energization of the control solenoid is used when:
- the ENGine BLEED P/B is selected "OFF",
- the ENGine FIRE P/B is RELEASED OUT,
The solenoid is automatically energized by the BMC in the following cases:
- over-temperature downstream of the precooler - the heat exchanger outlet temperature sensor senses a temperature above 257°C (527°F),
- overpressure downstream of the PRV when the pressure-regulated transducer senses a pressure greater than 57 psi,
- leak detection in pylon/wing/fuselage ducts and surrounding areas,
- APU bleed valve not closed,
- corresponding starter valve not closed.

OPV

The Overpressure Valve (OPV), which is normally open, closes pneumatically. The OPV starts to close at 75 psi. It is fully closed at 85 psi and opens again at around 35 psi.

REGULATED PRESSURE

A transducer, connected to both BMCs, reads the regulated pressure downstream from the PRV. This pressure is indicated on the ECAM.

TRANSFERRED PRESSURE

A transducer, connected to the related BMC, reads the transferred pressure downstream from the High Pressure Valve (HPV). This pressure is used to monitor the PRV and the HPV.

FAV/CONTROL THERMOSTAT

The Fan Air Valve (FAV) pneumatically regulates the fan airflow to the precooler for bleed air temperature regulation at 200°C (392°F). The FAV is pneumatically controlled by an external servo-control: the FAV control thermostat (CTL THERMST), located downstream from the precooler.

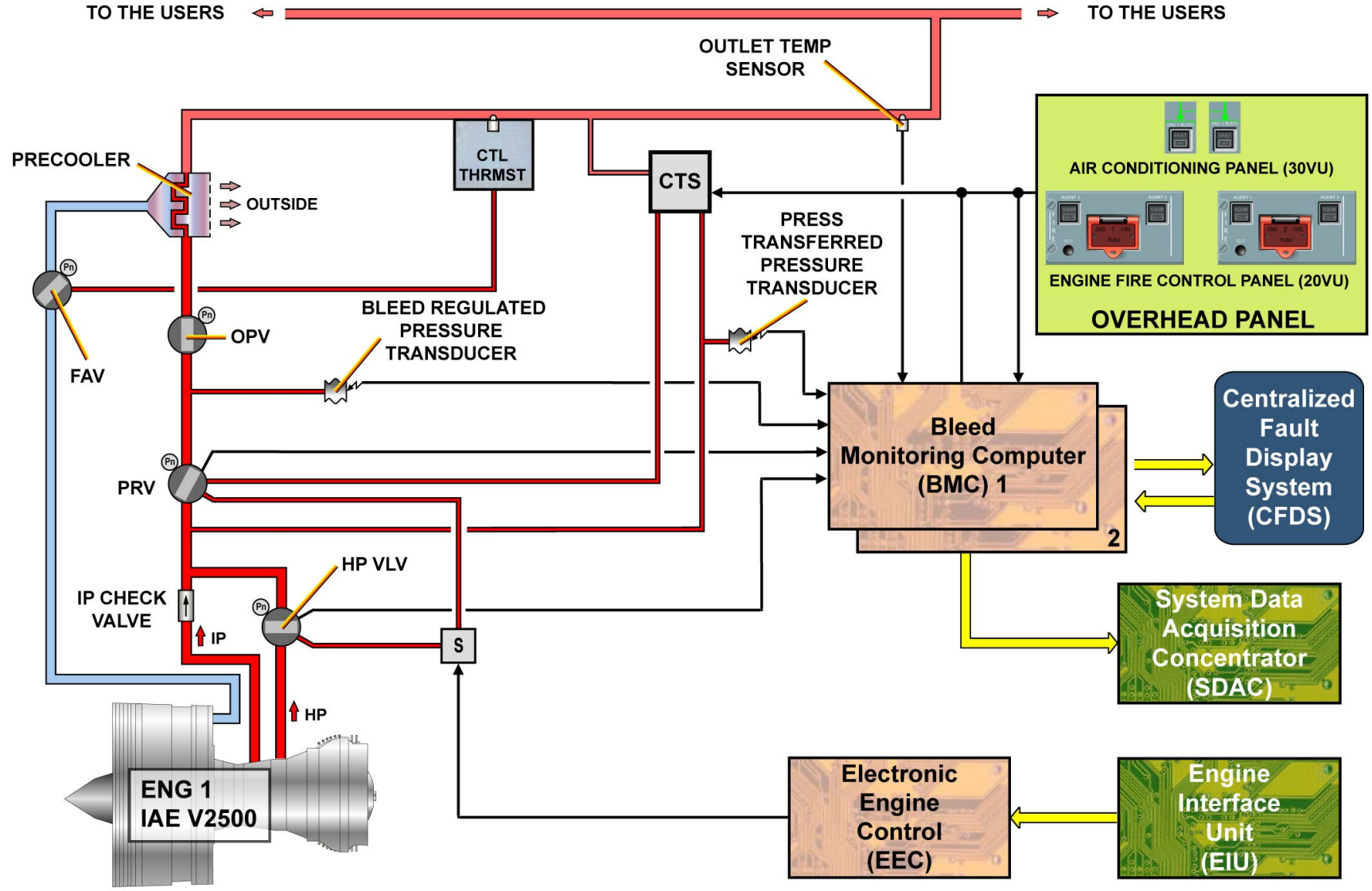
PRECOOLER

The precooler is an air-to-air heat exchanger.

HEAT EXCHANGER OUTLET TEMPERATURE SENSOR

The heat exchanger outlet temperature sensor, connected to both BMCs, reads the regulated temperature downstream from the precooler. This temperature is shown on the ECAM and used to monitor the system.

NOTE: Note: If the precooler exchanger outlet temperature reaches 240°C (464°F), the BMC generates a class 2 maintenance message - "AIR BLEED" - on the ECAM STATUS page. An associated maintenance message "Thermostat (THRMST), FAV or sense line" can be seen on the PFR, or on the MCDU.



B2 SCOPE ... HEAT EXCHANGER OUTLET TEMPERATURE SENSOR

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APU BLEED AIR SPLY/X-BLEED SYSTEM D/O (3)

B2 SCOPE

CAUTION: MODULE TAGGED B2 SCOPE.
BE AWARE THAT ONLY AVIONICS/ELECTRICAL TOPICS SHOULD BE LEARNED FOR A T2 COURSE.

APU BLEED

The APU bleed air supplies the pneumatic system, through the APU bleed valve, if the APU is running.
The Bleed Load Valve for the APU GTCP 36-300A (GARRETT) and the Load Control Valve of Honeywell APU 131-9A are electrically controlled by the ECB (solenoid) and pneumatically operated. In the absence of air pressure or electrical power, the valves are spring-loaded closed.
The APU Bleed Control Valve for the APIC APU is electrically controlled and fuel operated by a servo valve. The Electronic Control Box (ECB) controls the servo valve and fuel muscle pressure opens or closes the APU bleed valve. In the absence of fuel pressure or electrical power, the valve shuts off the bleed supply to the aircraft pneumatic system.

NOTE: These valves are of the ON/OFF type.

X-BLEED SYSTEM

A ground cart may also supply the pneumatic system. The ground air supply duct is connected to the left hand side of the crossbleed duct.
The crossbleed (X-BLEED) valve is an electrically controlled shut-off valve operated by two electrical DC motors.
The X-BLEED valve is used to isolate or connect the left and right bleed air systems:
- the primary motor is used for AUTOmatic mode. The Bleed Monitoring Computer (BMC) controls the position of the valve according to the APU bleed configuration,
- the secondary motor is used for manual operation. The X-BLEED selector on the overhead panel controls the position of the valve.
OPEN position is used for:
- left and right pack supply using single engine bleed,
- left and right Wing Anti-Ice supply using single engine bleed,
- left and right pack supply using ground air supply,
- Engine crossbleed start using opposite engine bleed,
- Engine 2 start using ground air supply.
SHUT position is used to:
- confirm automatic closure during bleed leak detection.

HP GROUND CONNECTION

A ground cart may supply the pneumatic system. The supply duct is located on the left hand side of the cross bleed valve. Only the LH bleed system is supplied. When the X-BLEED selector is in the OPEN position, the ground air supply will be available to supply the LH and RH system together.

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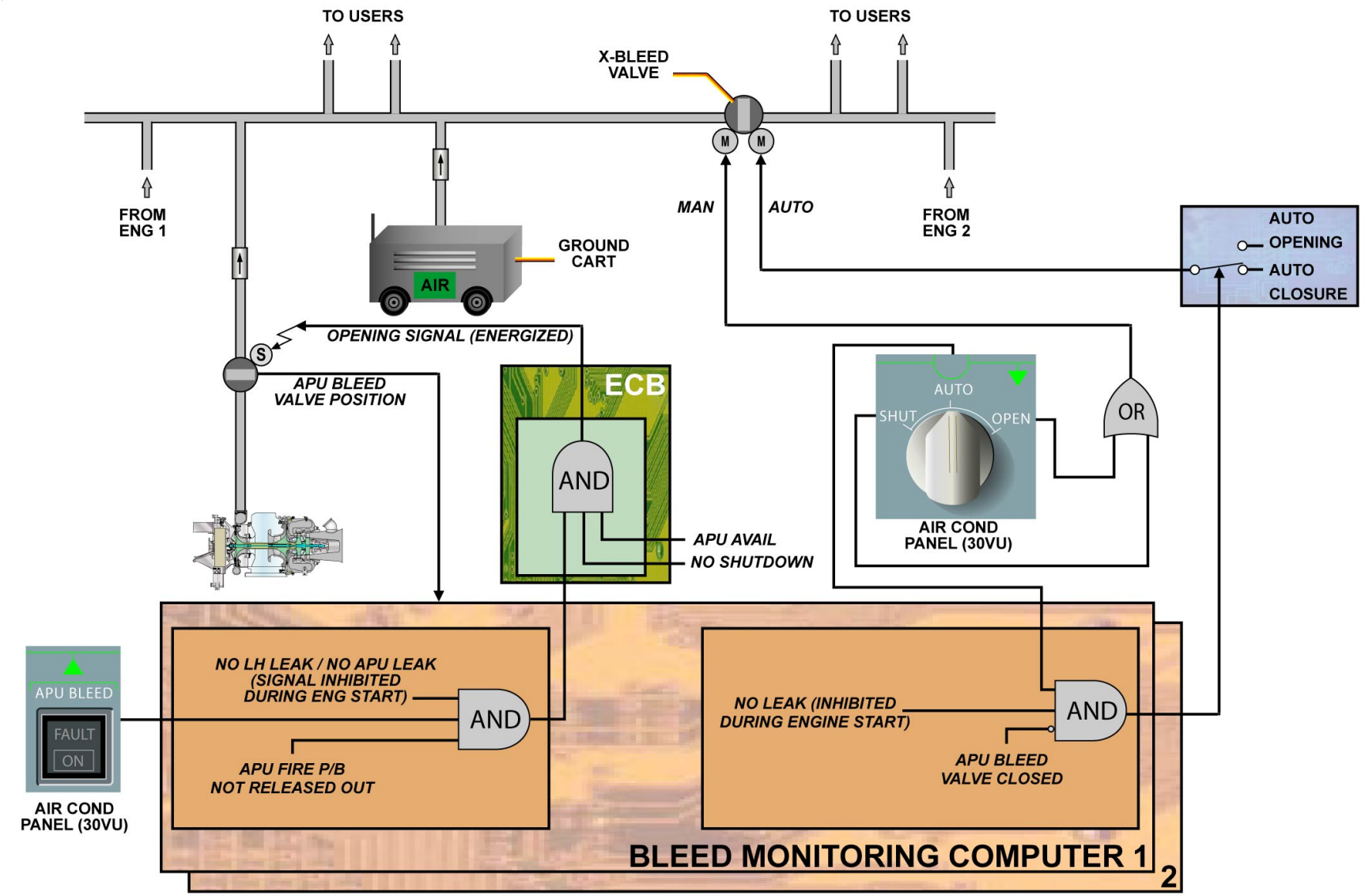

B2 SCOPE ... HP GROUND CONNECTION

PNEUMATIC SYSTEM OPERATION (3)

APU AIR BLEED SELECTION

When the APU runs and the APU BLEED P/BSW is released out, the supply air goes up to the APU bleed valve which is closed. When the APU BLEED P/BSW is selected in the ON position the APU bleed valve opens, the Pressure Regulator Valves (PRVs) are maintained electrically closed and the X BLEED valve is automatically opened, provided the X BLEED valve selector is in the AUTOmatic position.

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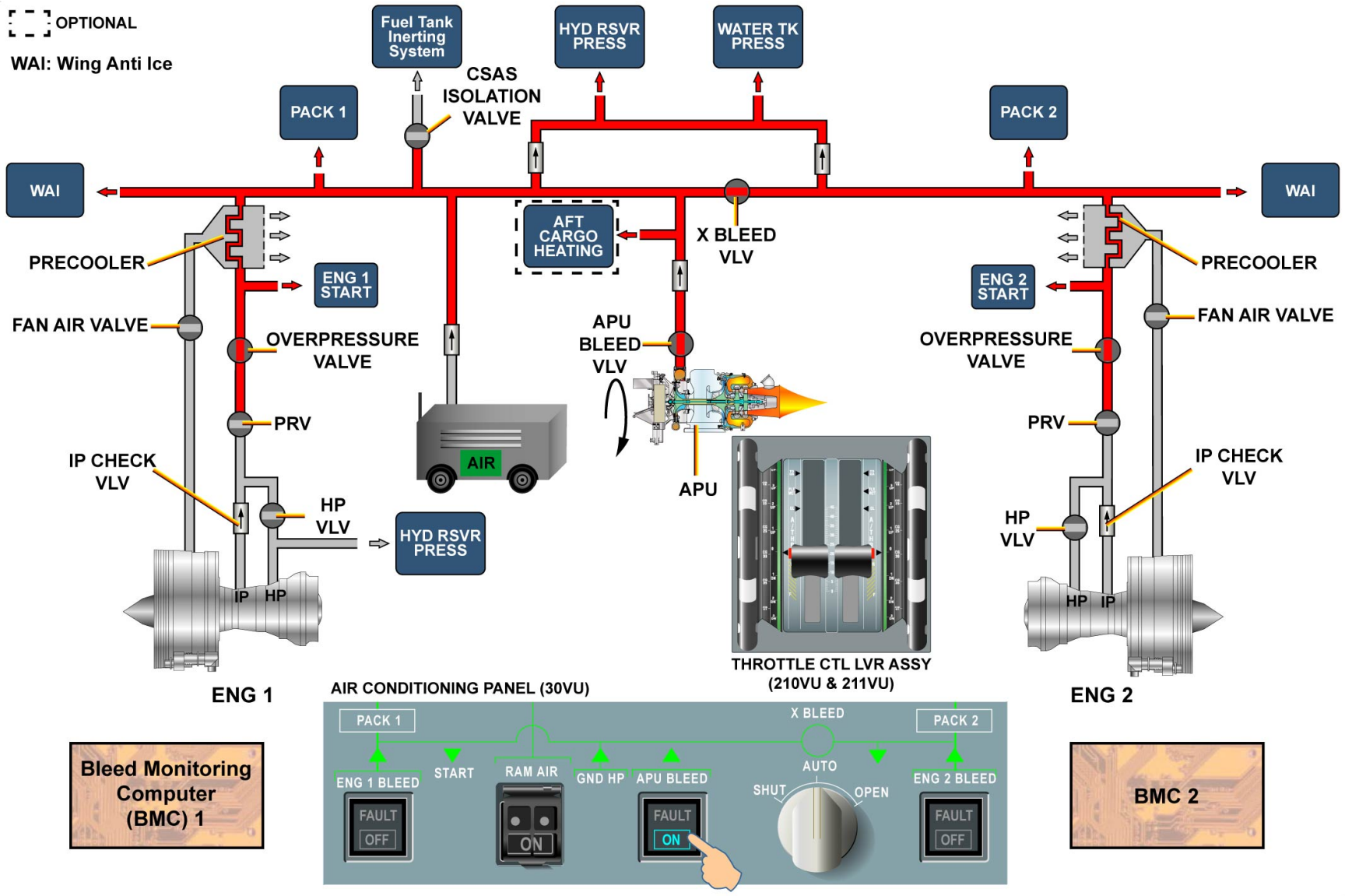
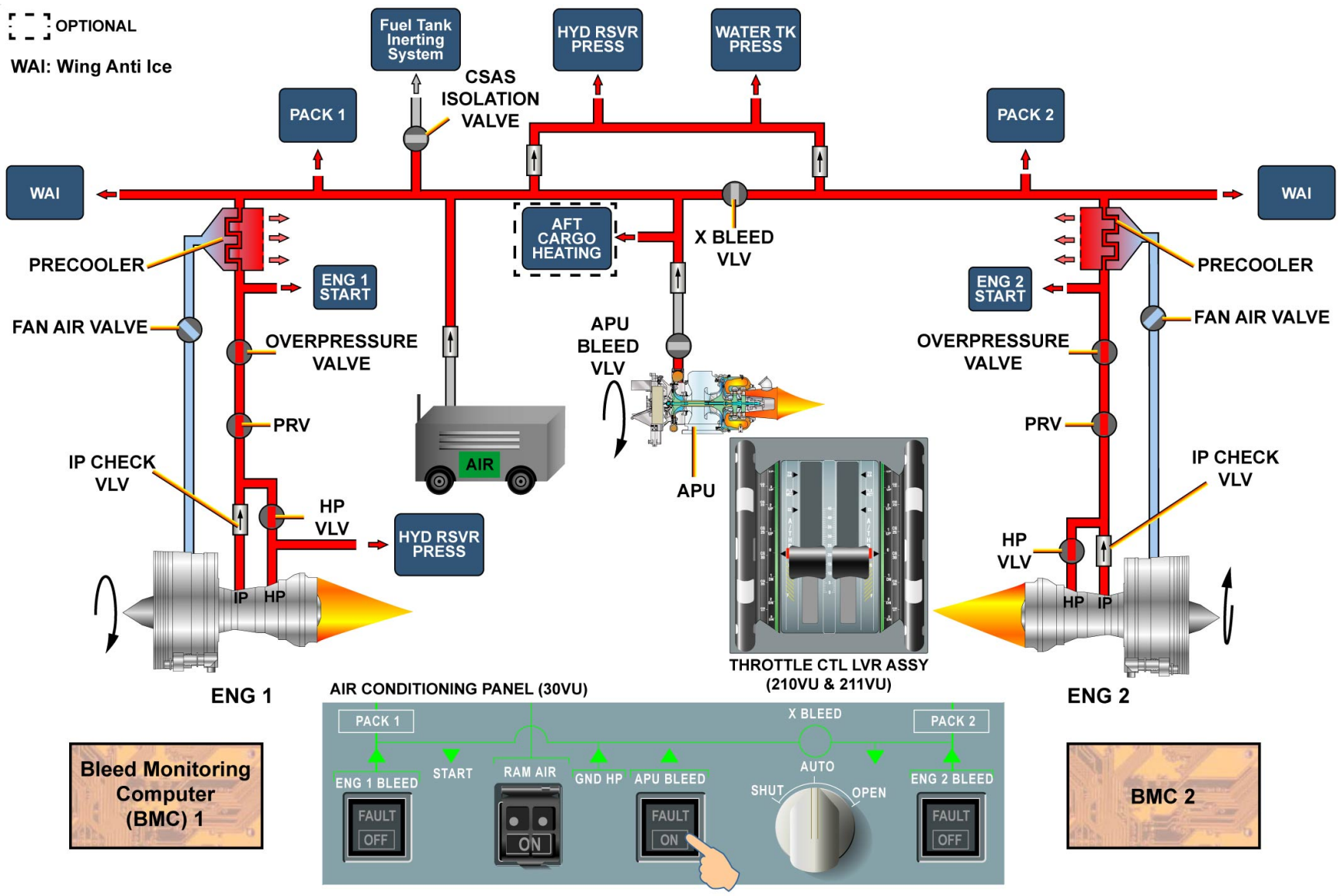


APU AIR BLEED SELECTION

PNEUMATIC SYSTEM OPERATION (3)

ENGINE AIR BLEED SELECTION

When one engine or both engines run and the APU runs, each PRV remains electrically closed by the related Bleed Monitoring Computer (BMC). When both engines run, the APU continues to supply air as long as the APU bleed valve remains open. When the APU BLEED valve P/BSW is released out, the APU bleed valve closes, the X BLEED valve closes automatically and the PRVs open.



ENGINE AIR BLEED SELECTION

PNEUMATIC SYSTEM OPERATION (3)

HP/IP ENGINE STAGE PRIORITY

The APU is shut down and both engines are running.

THROTTLE LEVERS IN IDLE POSITION

With both throttle levers in the idle position, the HP (High Pressure) Valves (VLVs) are open and supplying air.

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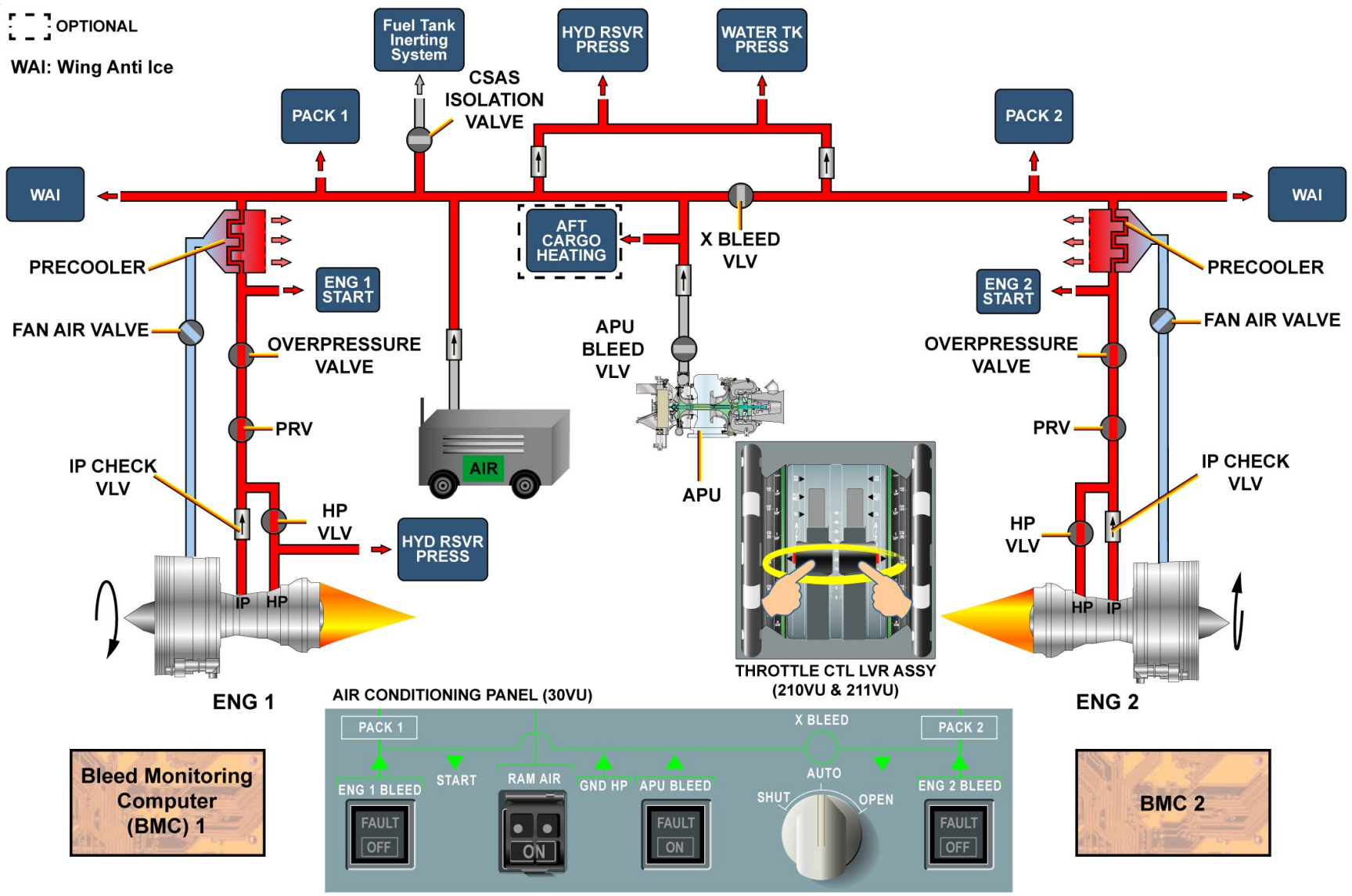


HP/IP ENGINE STAGE PRIORITY - THROTTLE LEVERS IN IDLE POSITION

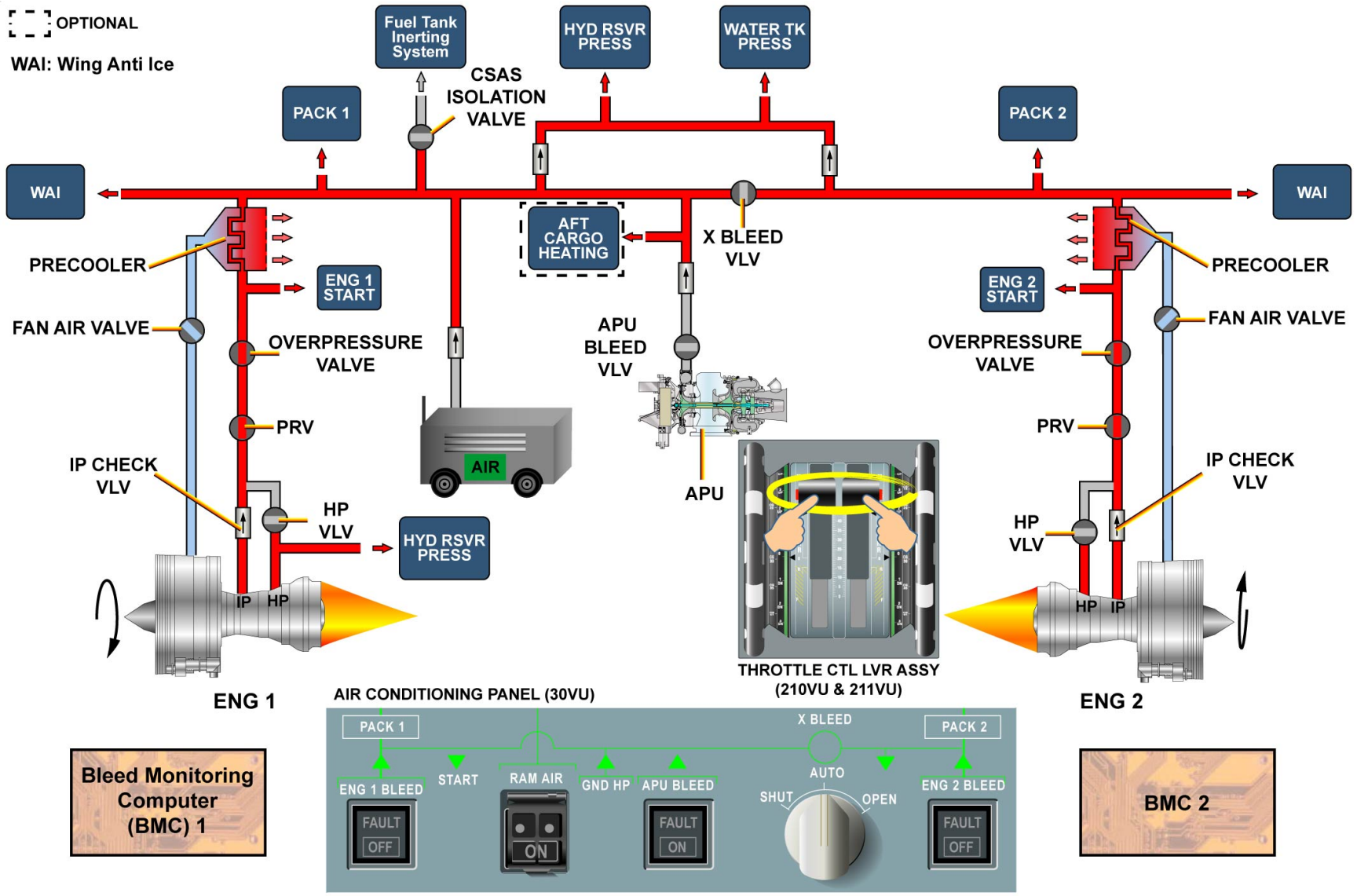
PNEUMATIC SYSTEM OPERATION (3)

HP/IP ENGINE STAGE PRIORITY (continued)

THROTTLE LEVER IN TAKE-OFF POSITION

When the power of the engines is increased to the Takeoff (TO) position, the HP VLV is closed, and the bleed air is supplied by the Intermediate Pressure (IP) stage.

NOTE: Note: if you set again the throttle levers in the idle position, the HP VLV is open again.



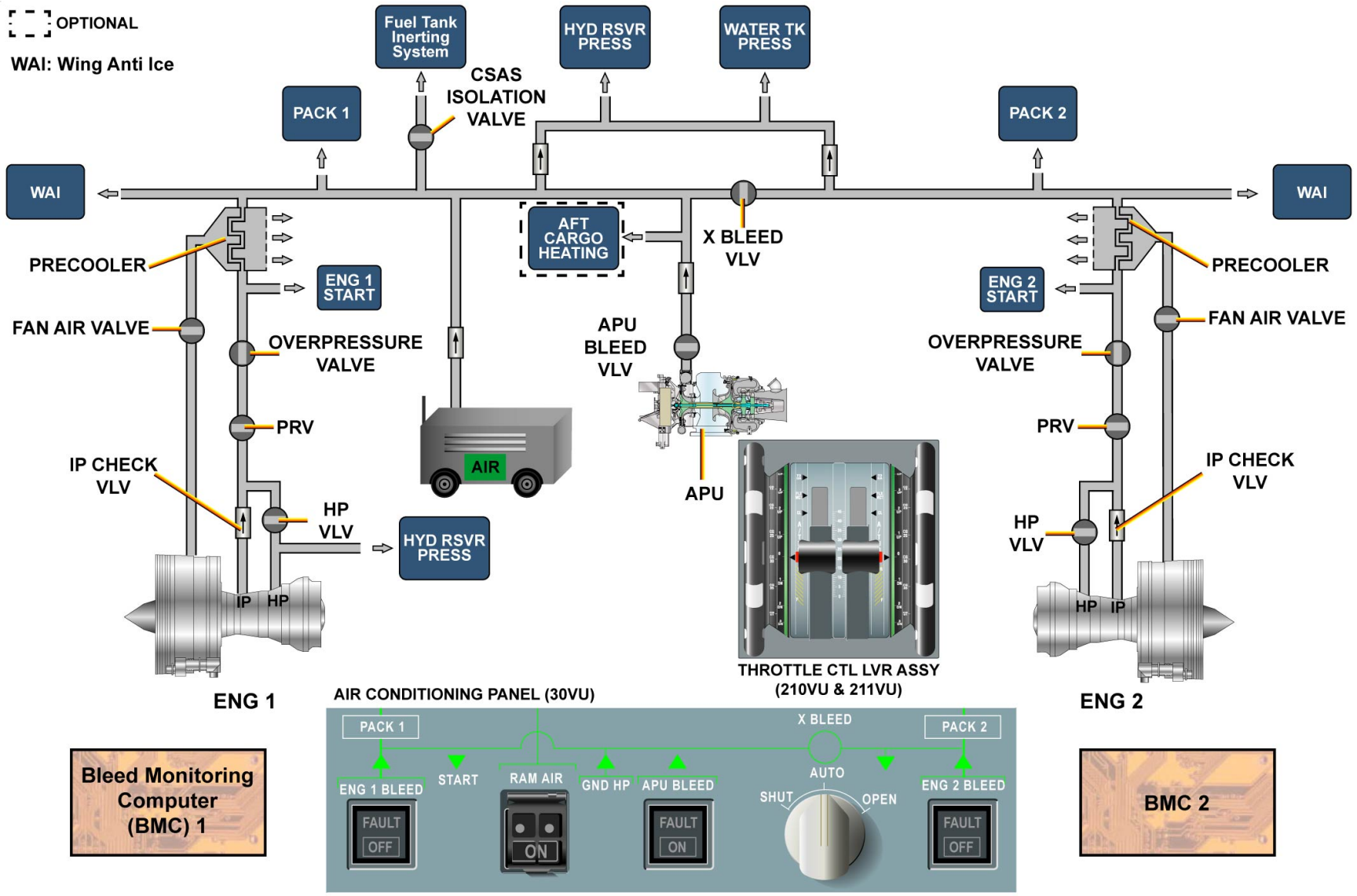
HP/IP ENGINE STAGE PRIORITY - THROTTLE LEVER IN TAKE-OFF POSITION

PNEUMATIC SYSTEM OPERATION (3)

HP/IP ENGINE STAGE PRIORITY (continued)

ENGINES SHUT DOWN

When the engines are shut down, the PRV, Fan Air Valve (FAV) and HP VLV are springloaded closed due to the lack of air pressure.



HP/IP ENGINE STAGE PRIORITY - ENGINES SHUT DOWN

PNEUMATIC SYSTEM OPERATION (3)

GROUND AIR SUPPLY

The ground air supply is provided by a ground air cart connected to the HP ground connector. Only the LH bleed system is supplied. When the X BLEED valve selector is selected in the OPEN position, the ground air supply is available to feed the LH and RH bleed system.

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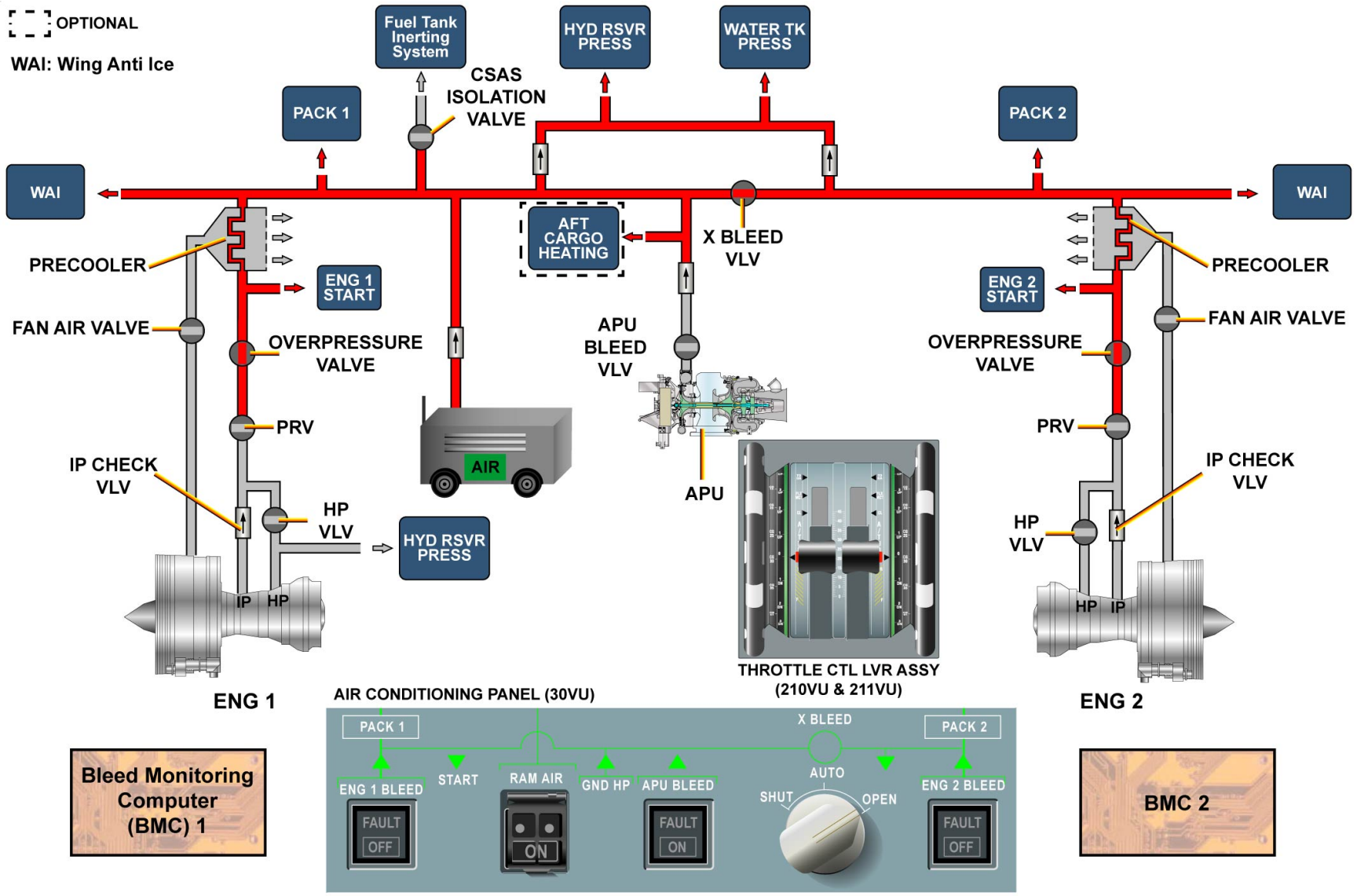

GROUND AIR SUPPLY

BMC INTERFACES (3)

INPUTS

Each Bleed Monitoring Computer (BMC) has three types of inputs:
- DIGITAL INPUTS via ARINC 429 buses, from the opposite BMC, corresponding Engine Interface Unit (EIU) and Centralized Fault Display Interface Unit (CFDIU),
- ANALOG INPUTS from the bleed sensors,
- DISCRETE INPUTS from valve position switches, BMC and overhead panel. 28V DC power is supplied for energization of the bleed Pressure Regulating Valve (PRV) control solenoid.

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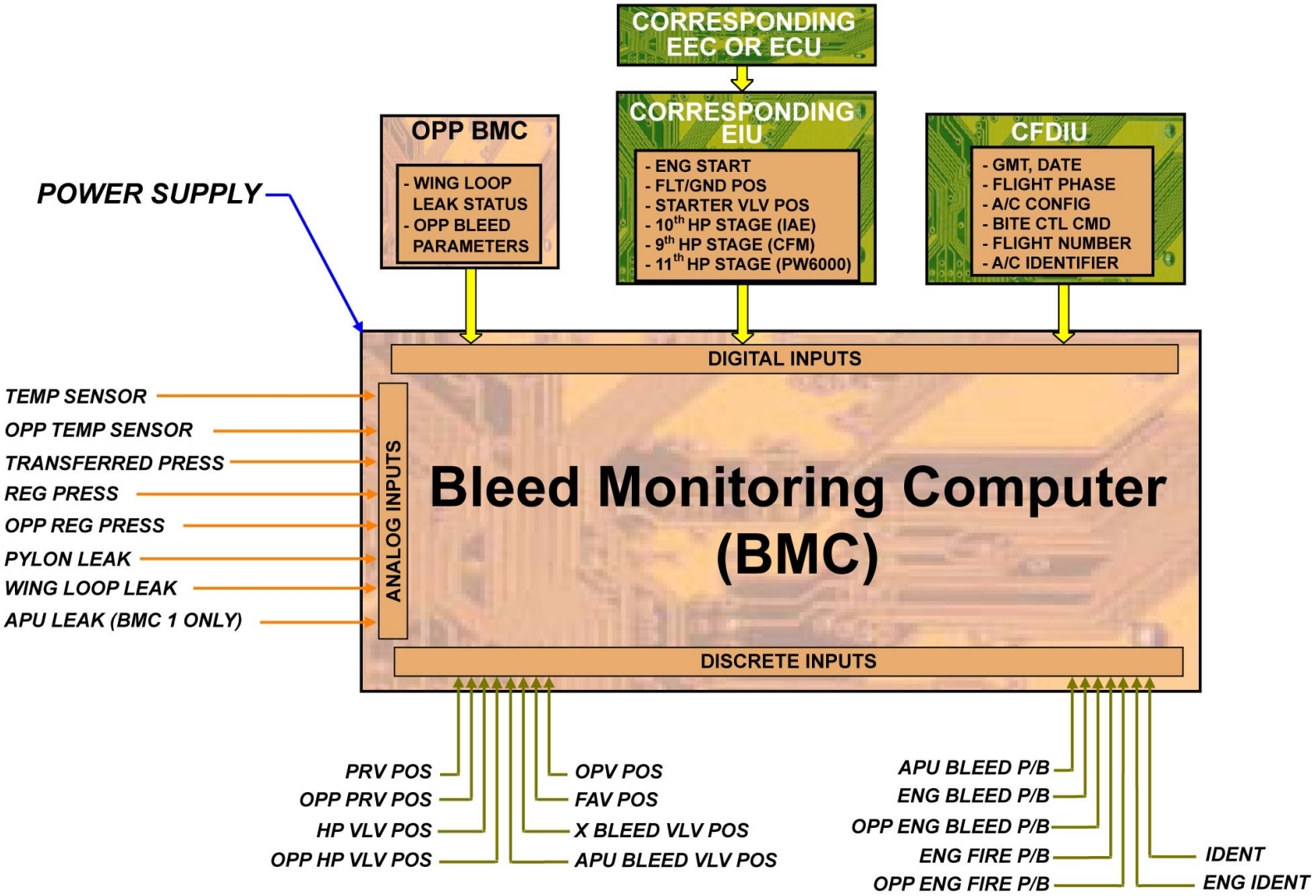
CORRESPONDING EEC OR ECU
CORRESPONDING EIU
- ENG START
- FLT/GND POS
- STARTER VLV POS
- 10th HP STAGE (IAE)
- 9th HP STAGE (CFM)
- 11th HP STAGE (PW6000)
OPP BMC
- WING LOOP LEAK STATUS
- OPP BLEED PARAMETERS
CFDIU
- GMT, DATE
- FLIGHT PHASE
- A/C CONFIG
- BITE CTL CMD
- FLIGHT NUMBER
- A/C IDENTIFIER
POWER SUPPLY
DIGITAL INPUTS
ANALOG INPUTS
Bleed Monitoring Computer (BMC)
DISCRETE INPUTS
TEMP SENSOR
OPP TEMP SENSOR
TRANSFERRED PRESS
REG PRESS
OPP REG PRESS
PYLON LEAK
WING LOOP LEAK
APU LEAK (BMC 1 ONLY)
PRV POS
OPP PRV POS
HP VLV POS
OPP HP VLV POS
OPV POS
FAV POS
X BLEED VLV POS
APU BLEED VLV POS
APU BLEED P/B
ENG BLEED P/B
OPP ENG BLEED P/B
ENG FIRE P/B
OPP ENG FIRE P/B
IDENT
ENG IDENT

INPUTS

BMC INTERFACES (3)

OUTPUTS

Each BMC has two types of outputs:
- DIGITAL OUTPUTS via ARINC 429 buses to the System Data Acquisition Concentrators (SDACs) for ECAM warnings and indications, the CFDIUs for maintenance purposes, and the opposite BMC for bleed monitoring purposes,
- DISCRETE OUTPUTS to the APU Electronic Control Box (ECB) for APU availability, to the overhead panel for bleed faults, to the cross bleed valve, control solenoid and Air Conditioning System Controller (ACSC).

NOTE: In case of BMC failure, the monitoring of main parameters such as High Pressure (HP) Valve (VLV), PRV, heat exchanger outlet temperature sensor, and regulated pressure transducer, is kept, but the automatic control of the PRV is lost.

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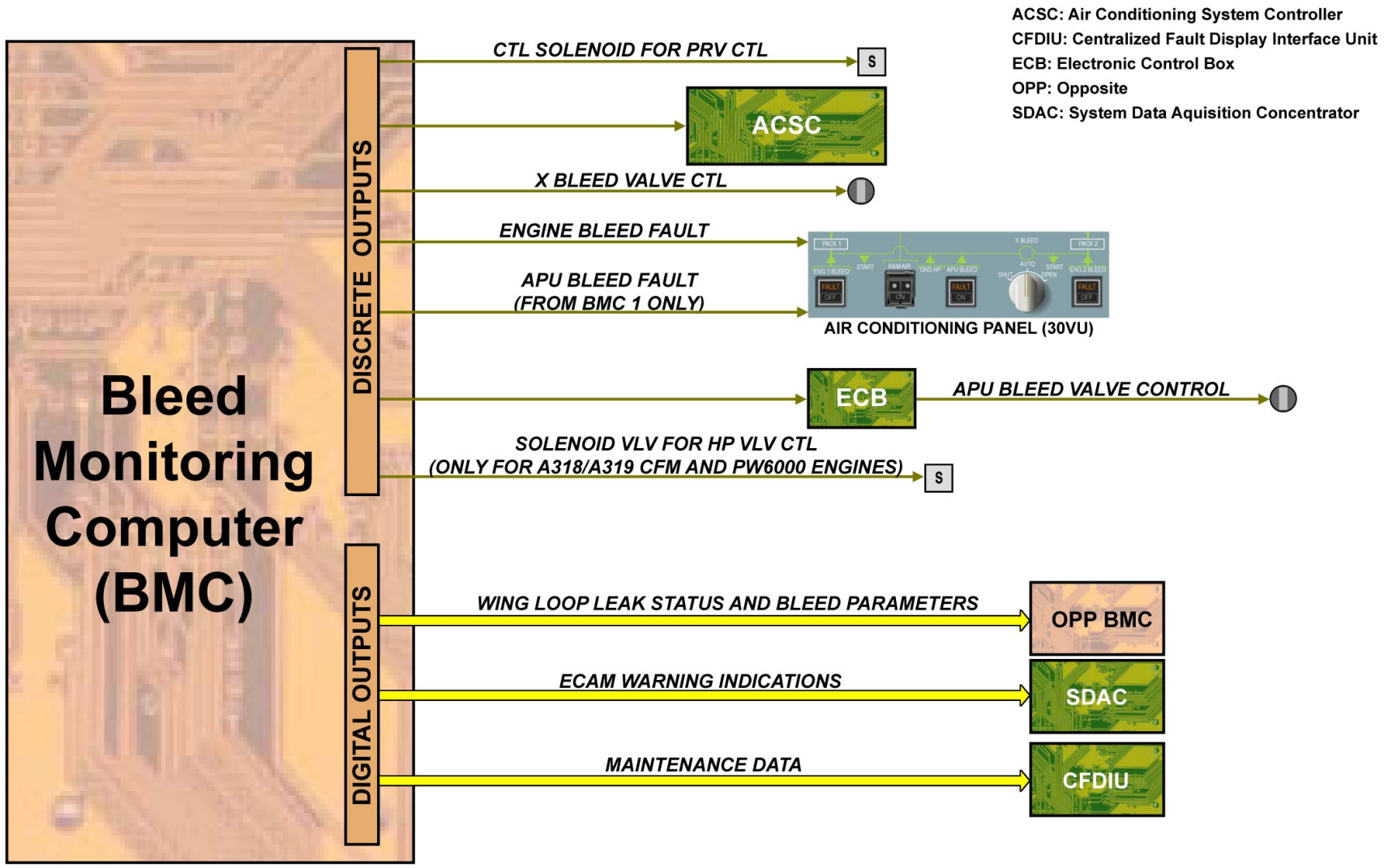
ACSC: Air Conditioning System Controller
CFDIU: Centralized Fault Display Interface Unit
ECB: Electronic Control Box
OPP: Opposite
SDAC: System Data Aquisition Concentrator
Bleed Monitoring Computer (BMC)
DISCRETE OUTPUTS
DIGITAL OUTPUTS
CTL SOLENOID FOR PRV CTL
S
ACSC
X BLEED VALVE CTL
ENGINE BLEED FAULT
APU BLEED FAULT
(FROM BMC 1 ONLY)
AIR CONDITIONING PANEL (30VU)
ECB
APU BLEED VALVE CONTROL
SOLENOID VLV FOR HP VLV CTL
(ONLY FOR A318/A319 CFM AND PW6000 ENGINES)
S
WING LOOP LEAK STATUS AND BLEED PARAMETERS
OPP BMC
ECAM WARNING INDICATIONS
SDAC
MAINTENANCE DATA
CFDIU

OUTPUTS

PNEUMATIC LEAK DETECTION SYSTEM D/O (3)

B2 SCOPE

CAUTION: MODULE TAGGED B2 SCOPE.
BE AWARE THAT ONLY AVIONICS/ELECTRICAL TOPICS
SHOULD BE LEARNED FOR A T2 COURSE.

ROUTING

The leak detection system is used to detect leaks in the vicinity of the packs, wings, pylons and APU hot air ducts. Each wing is monitored by a double loop. The pylon and APU hot air ducts are monitored by a single loop. A continuous monitoring system detects ambient overheat in the vicinity of the hot air ducts.
Protected areas with double loop for:
- RH wing and pack 2,
- LH wing, pack 1 and mid fuselage APU duct.

Protected areas with single loop for:
- LH and RH pylons,
- AFT fuselage APU duct.

NOTE: Each loop consists of sensing elements connected in series.

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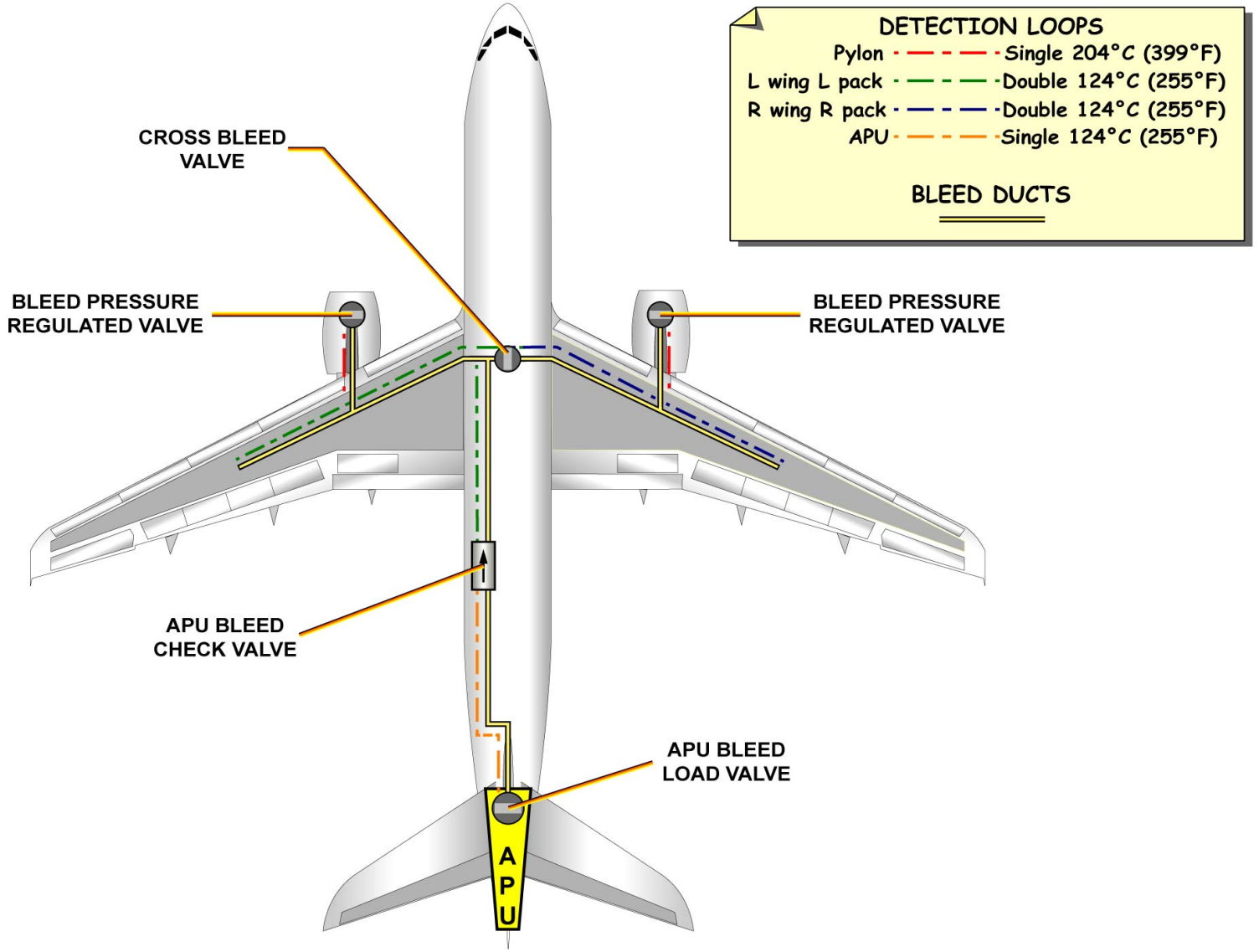

B2 SCOPE & ROUTING

PNEUMATIC LEAK DETECTION SYSTEM D/O (3)

WARNING LOGIC

Both Bleed Monitoring Computers (BMCs) receive signals from the leak detection loops. They exchange data via an ARINC bus for the wing double loop detection.

NOTE: The wing loops A are connected to BMC 1 and wing loops B to BMC 2. The crosstalk bus allows wing leak warnings to be activated through an AND logic. The APU loop is connected to BMC 1 only. The pylon loop is connected to the related BMC.

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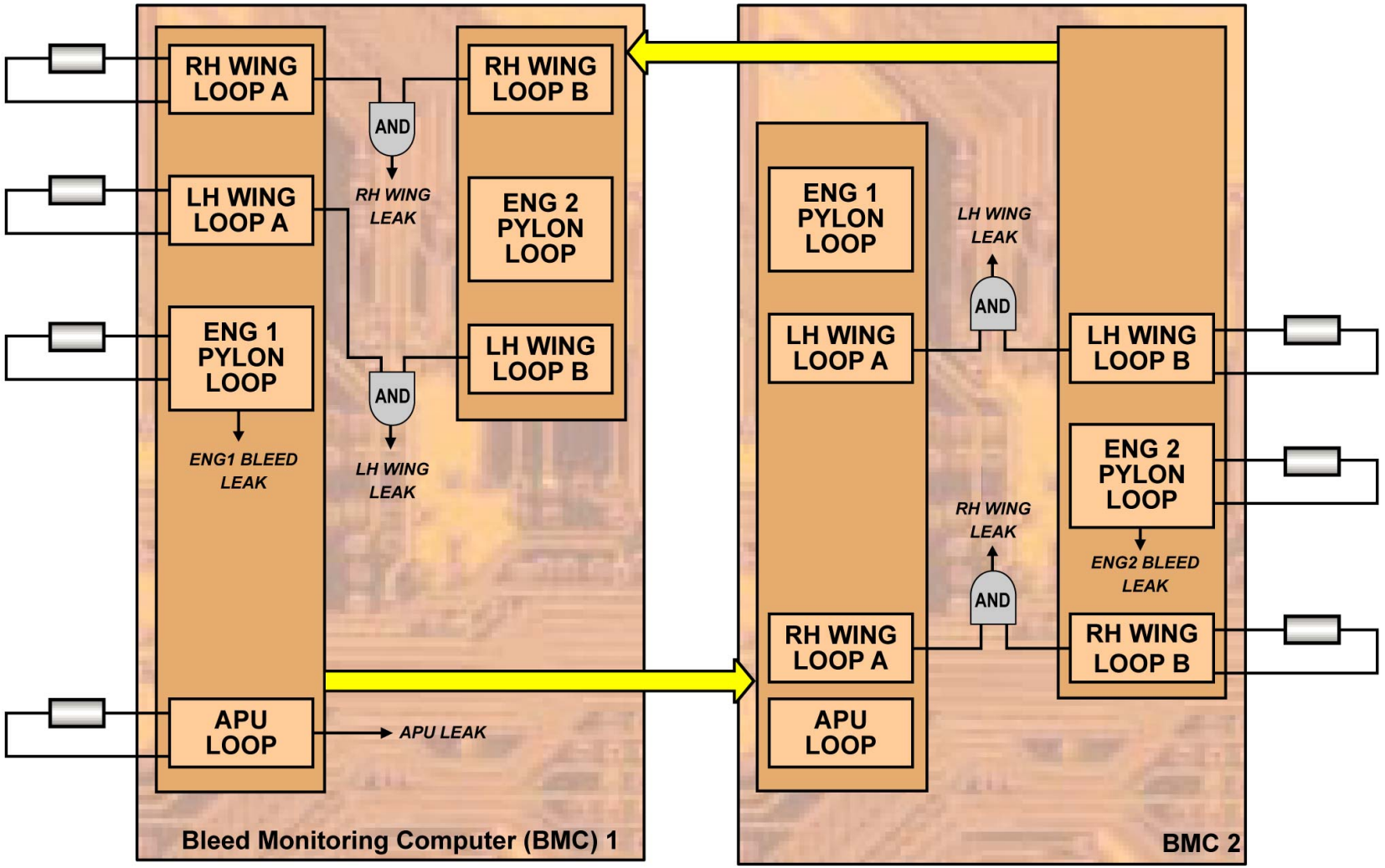

WARNING LOGIC

PNEUMATIC LEAK DETECTION SYSTEM D/O (3)

FAULT LOGIC

The ENG BLEED FAULT light comes on when a leak is detected by the wing loops A and B or by the pylon loop. The APU BLEED FAULT light comes on when an APU duct leak is detected. If one BMC is failed, the adjacent BMC takes over monitoring of the bleed system and ensures the following ECAM warnings:
- OVERPRESSure,
- OVERTEMPerature,
- WING LEAK.

Nevertheless the associated FAULT light on the AIR CONDitioning panel is lost, and the associated bleed valve does not close automatically. The ENG BLEED LEAK warning is lost for the associated engine as well as the APU BLEED LEAK warning if BMC 1 is failed.

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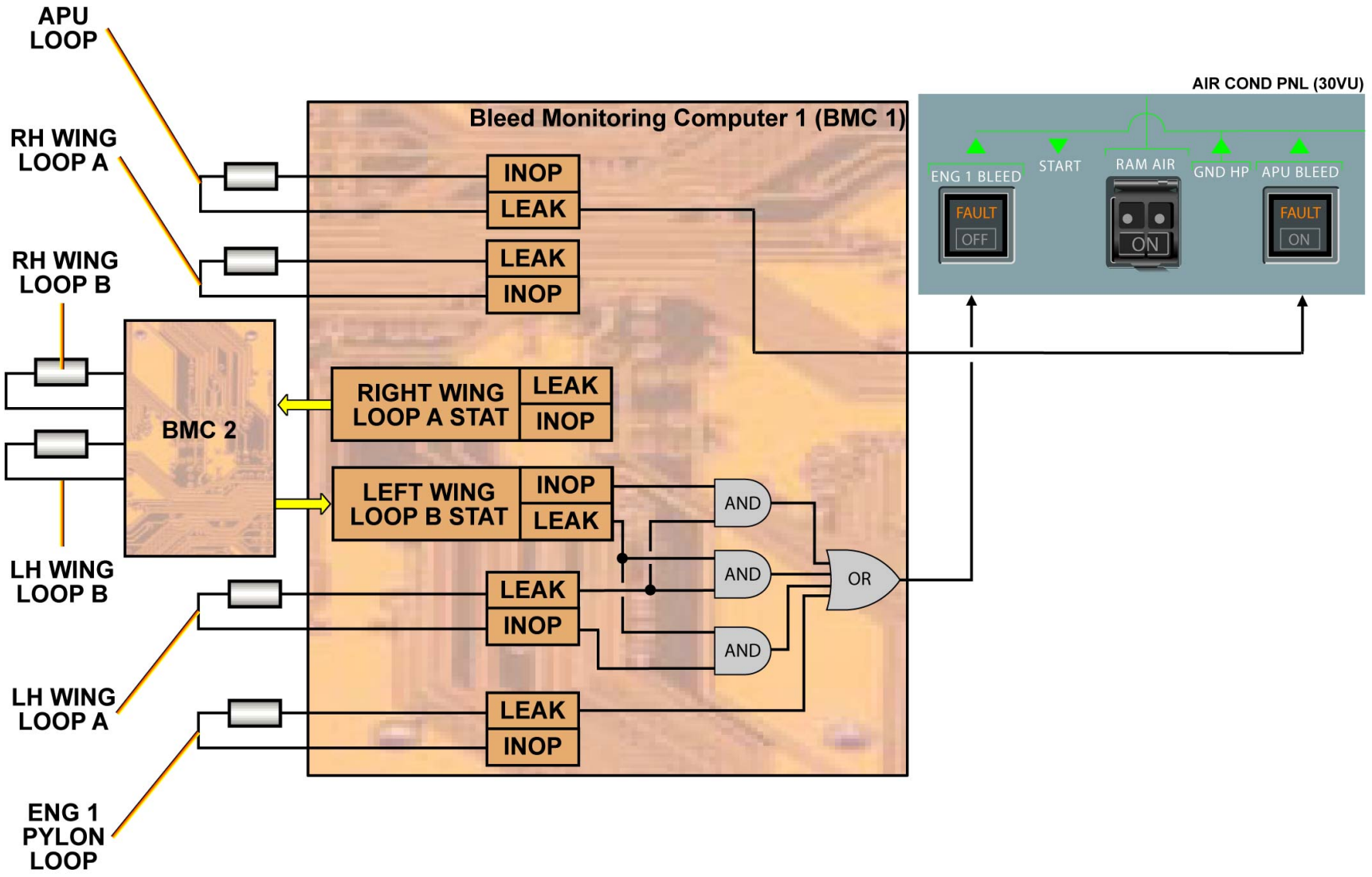

FAULT LOGIC

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PNEUMATIC LEAK DETECTION SYSTEM D/O (3)

LEAK CONSEQUENCE

A detected leak will close associated valves, as shown on this table. These valves are automatically controlled to close if they were open.

NOTE: APU and cross bleed (X-BLEED) valves do not close during Main Engine Start (MES).

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TYPE OF FAILURE	ENG 1 FAULT (PYLON LEAK OR LH WING LEAK)	ENG 2 FAULT (PYLON LEAK OR RH WING LEAK)	APU LEAK (EXCEPT DURING ENGINE START)
AUTOMATIC RESPONSE/ VALVE CLOSURE	- PRV 1 - ANTI-ICE VALVE 1 - X BLEED VALVE (IN AUTO) - APU BLEED VALVE	- PRV 2 - ANTI-ICE VALVE 2 - X BLEED VALVE (IN AUTO)	- APU BLEED VALVE - X BLEED VALVE (IN AUTO)

LEAK CONSEQUENCE

PNEUMATIC SYSTEM LINE MAINTENANCE (2)

MEL/DEACTIVATION

PRV AND HPV DEACTIVATION

In case of failure, the pneumatic system HPV must be deactivated CLOSED for dispatch per Minimum Equipment List.
The deactivation procedure is the same for both valves.
Procedure:
- associated BLEED switch selected OFF,
- APU BLEED switch selected OFF,
- open the fan cowl,
- deactivate the thrust reverser at the Hydraulic Control Unit (HCU),
- open the thrust reverser cowl,
- on the PRV, move the manual override to the CLOSED position,
- secure in CLOSED position with locking pin,
- close thrust reverser cowls,
- reactivate the thrust reverser,
- close the fan cowl.

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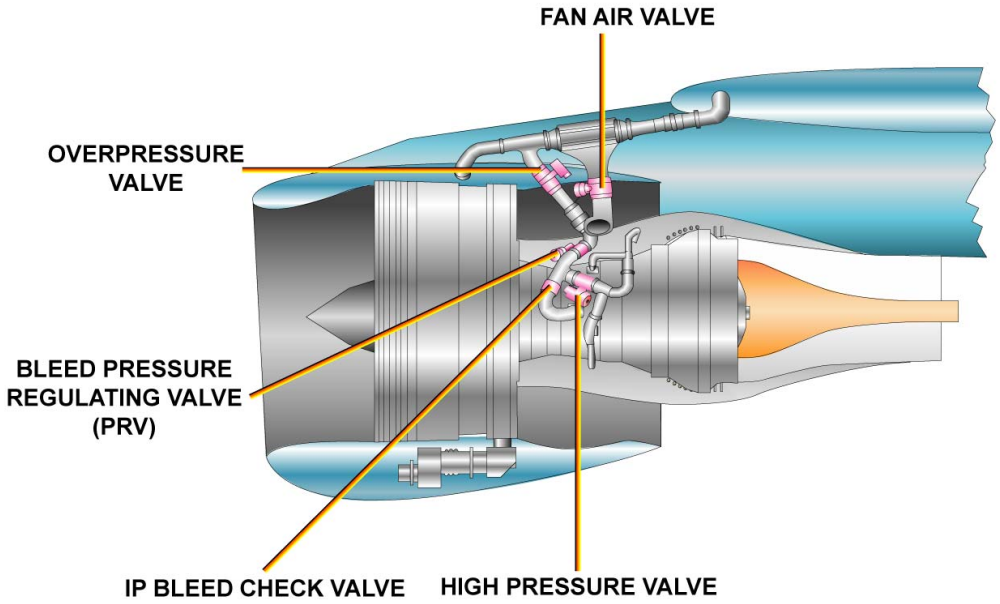
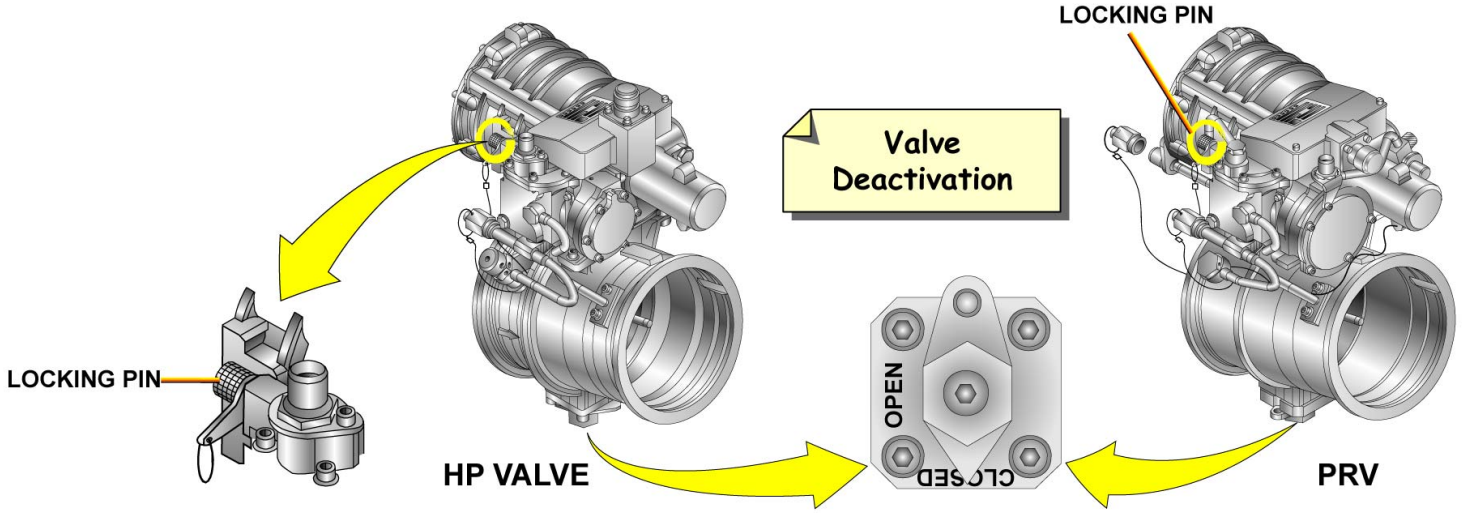


Deactivate for safety when working on the engine

HYDRAULIC CONTROL UNIT (HCU)



MEL/DEACTIVATION - PRV AND HPV DEACTIVATION

PNEUMATIC SYSTEM LINE MAINTENANCE (2)

MEL/DEACTIVATION (continued)

WING LEAK DETECTION

The WING leak detection is a dual-loop system. To generate a WING LEAK warning, both A and B loops have to detect the overheat. For dispatch, WING leak detection must be operational (at least one loop) on each wing. If a single loop fails, the MAINTENANCE message AIR BLEED will be displayed on the STATUS page associated with a Centralized Fault Display System (CFDS) message L(R) WING LOOP (INOP). The aircraft may be dispatched per Minimum Equipment List with the MAINTENANCE message displayed.
For troubleshooting it is important to understand that the WING detection elements monitor much more than just the wings alone. The protected areas are:
- wing leading edge (wing anti-ice supply duct),
- air conditioning compartment - belly fairing - (pack supply, crossbleed manifold, APU supply, ground air supply),
- APU forward supply duct (from the APU check valve through the wheel well).

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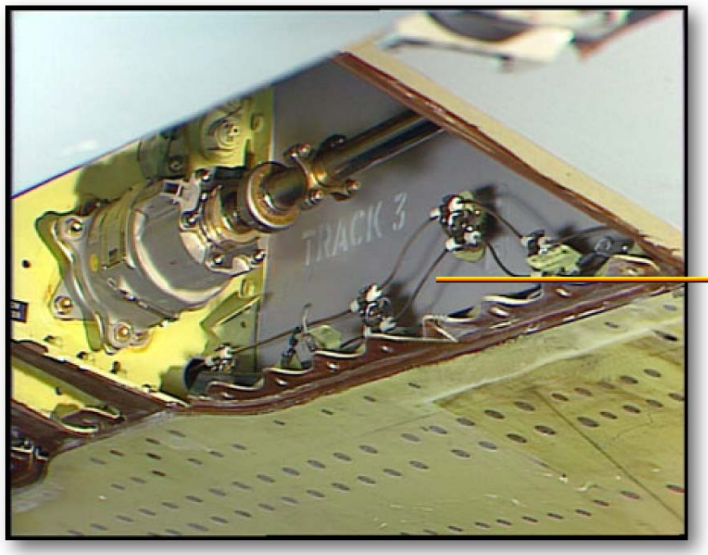
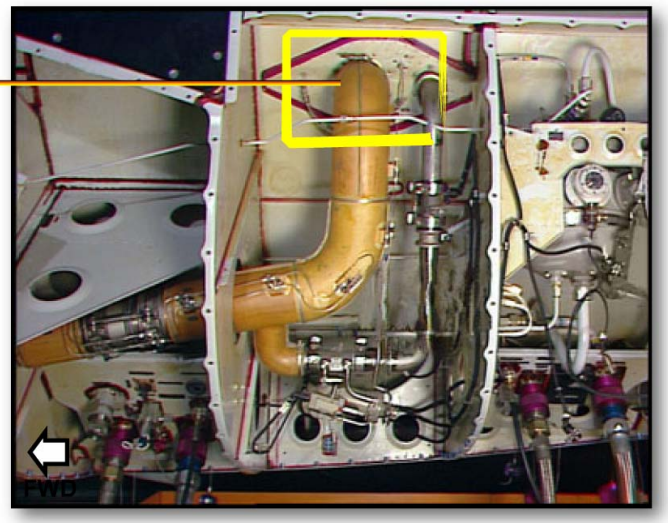
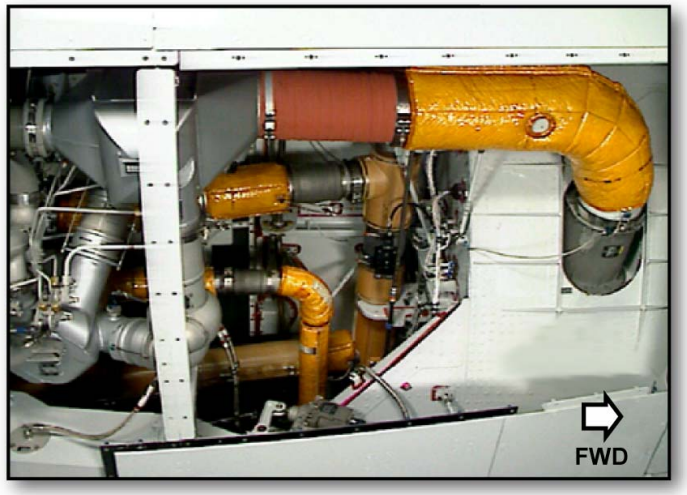


WING LEADING EDGE



FUSELAGE LEFT SIDE (AFT BELLY FAIRING)

The WING leak detection elements monitor more than the wings alone.
The protected areas are :
- Wing leading edge (wing anti-ice supply),
- Air conditioning compartment (pack supply, crossbleed manifold, APU supply, ground air supply)
- APU supply duct (from the APU check valve through the wheel well)



AIR CONDITIONING COMPARTMENT

MEL/DEACTIVATION - WING LEAK DETECTION

PNEUMATIC SYSTEM LINE MAINTENANCE (2)

MAINTENANCE TIPS

TROUBLESHOOTING NOTE

Normal operation of the pneumatic system does not require electric power. The HPV, PRV, OPV and FAV are all controlled and operated pneumatically.
The HPV, PRV, OPV and FAV are also connected to a dedicated reference pressure pneumatic Thermostat or solenoid.
During troubleshooting, it is very important to check the integrity of all pneumatic sense-line connections, in between the valves and its thermostat or solenoid.
The BMC monitors the system operation and shuts down the system in case of over temperature, over pressure or a Leak.
The BMC BITE does not confirm the integrity of the system.

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Example of Troubleshooting task from the TSM
FAN AIR VALVE FAULT

A318/A319/A320/A321
TROUBLE SHOOTING MANUAL

4. Fault Isolation

A. If the fault symptom is identified by the maintenance message:
FAN AIR V 9HA1 or THRM 7170HM1 or SENSE LINE
- do a check of the unions and clamps of the sense line between the fan air valve control thermostat and the fan air valve.

(1) If the unions are loose:
- tighten them.

(2) If the unions are correctly tightened:
- do a check of the filter of the fan air valve control thermostat (7170HM1).

(a) If the filter is clogged:
- clean (Ref. AMM TASK 36-11-43-100-001) or replace (Ref. AMM TASK 36-11-43-000-003) and (Ref. AMM TASK 36-11-43-400-003) the filter of the thermostat (7170HM1) as necessary.

(b) If the filter is not clogged:
- replace the THERMOSTAT-FAN AIR VALVE CTL (7170HM1) (Ref. AMM TASK 36-11-43-000-001) and (Ref. AMM TASK 36-11-43-400-001).
- disconnect the sense line from the fan air valve control thermostat (7170HM1) and put a blanking cap on the sense line
do a check of the opening of the fan air valve. Slowly apply 20 psi (1.3789 bar) at its test port (Ref. AMM TASK 36-11-54-720-001). The visual indicator must show that the fan air valve is fully open.

MAINTENANCE TIPS - TROUBLESHOOTING NOTE

PNEUMATIC SYSTEM LINE MAINTENANCE (2)

MAINTENANCE TIPS (continued)

TEST SET

A Test Set is available to assist in troubleshooting the pneumatic system. The test set enables calibrated pressure to be applied to individual valves, components and isolated parts of the system to check for normal operation and sense line integrity. Several kinds of valves can be tested through the pneumatic system test set like: Pressure Regulating Valve, High Pressure Valve, Overpressure Valve, Fan Air Valve.

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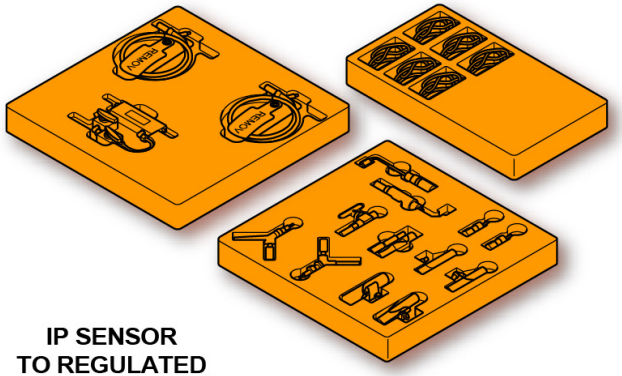
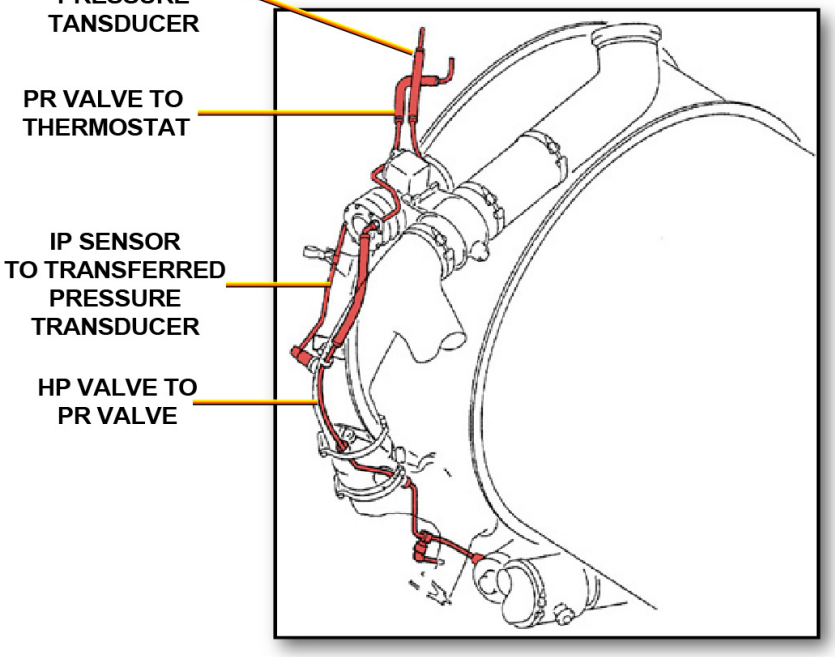
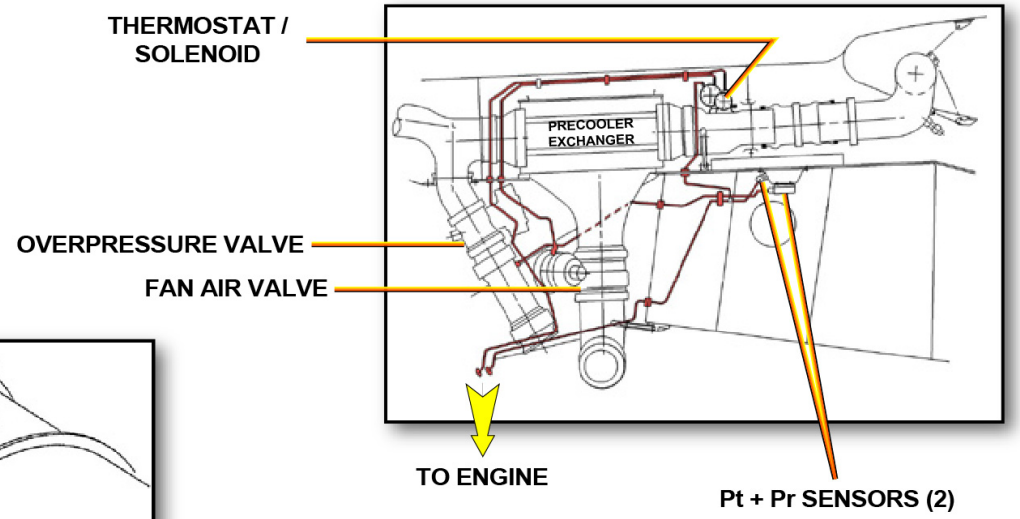
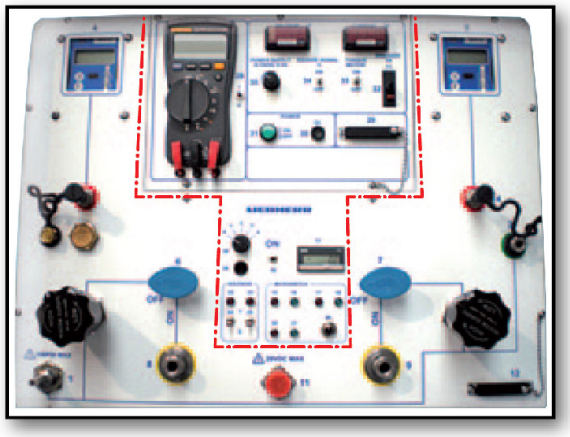



IP SENSOR TO REGULATED PRESSURE TANSDUCER
PR VALVE TO THERMOSTAT
IP SENSOR TO TRANSFERRED PRESSURE TRANSDUCER
HP VALVE TO PR VALVE

SENSE LINE ROUTING (ENGINE)

SENSE LINE ROUTING (PYLON)





PNEUMATIC SYSTEM TEST SET

MAINTENANCE TIPS - TEST SET

PNEUMATIC SYSTEM LINE MAINTENANCE (2)

MAINTENANCE TIPS (continued)

ENGINE START WITH GROUND AIR

To perform an engine start with ground air, the connection is located on the lower fuselage. The access door is on the belly fairing.
During a ground air start, the crossbleed valve must be operated manually. For safety, it is recommended to use the ground air supply to start the first engine. Then disconnect the ground air supply and perform a crossbleed start for the second engine.
On the ECAM BLEED page, the GND indication DOES NOT indicate ground air supply connected or available. This indication appears when the aircraft is on the ground to show that the ground air is directly supplied to the LEFT side of the system only. The left bleed system pressure indicator will indicate pressure when the ground air is supplied.

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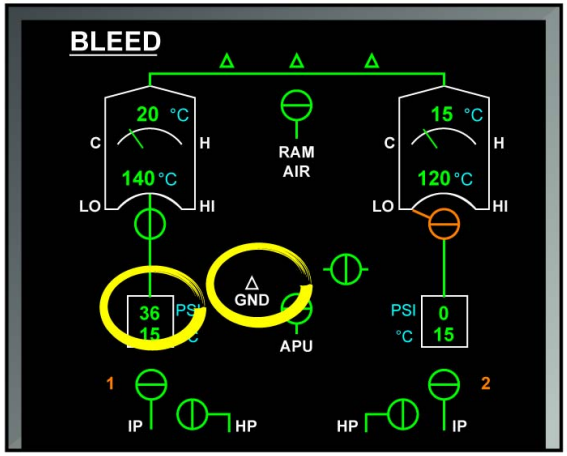

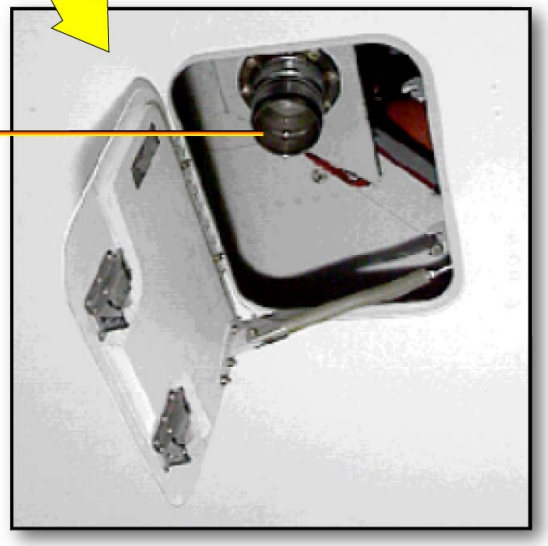

MAINTENANCE TIPS - ENGINE START WITH GROUND AIR

PNEUMATIC SYSTEM OPERATION, CONTROL & INDICATING (3)

ENG 1 BLEED FAULT (PR VALVE)

R WING BLEED LEAK

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